

Claims

- [c1] A component comprising an outer coating having a cubic microstructure and consisting essentially of zirconia stabilized with dysprosia, erbia, neodymia, samarium oxide or ytterbia, or zirconia stabilized with gadolinium oxide and yttria, or hafnia stabilized with dysprosia, gadolinium oxide, samarium oxide or ytterbia.
- [c2] A component according to claim 1, wherein the outer coating consists essentially of zirconia stabilized by about 10 to about 45 atomic percent dysprosia.
- [c3] A component according to claim 1, wherein the outer coating consists essentially of zirconia stabilized by about 10 to about 25 atomic percent erbia.
- [c4] A component according to claim 1, wherein the outer coating consists essentially of zirconia stabilized by about 10 to about 25 atomic percent gadolinium oxide and up to about 5 weight percent yttria.
- [c5] A component according to claim 1, wherein the outer coating consists essentially of zirconia stabilized by about 10 to about 25 atomic percent gadolinium oxide and about 4 to about 5 weight percent yttria.
- [c6] A component according to claim 1, wherein the outer coating consists essentially of zirconia stabilized by about 8 to about 22 atomic percent neodymia.
- [c7] A component according to claim 1, wherein the outer coating consists essentially of zirconia stabilized by about 10 to about 25 atomic percent samarium oxide.
- [c8] A component according to claim 1, wherein the outer coating consists essentially of zirconia stabilized by about 8 to about 30 atomic percent ytterbia.
- [c9] A component according to claim 1, wherein the outer coating consists essentially of zirconia stabilized by about 8 to about 30 atomic percent ytterbia and up to about 5 weight percent yttria.

- [c10] A component according to claim 1, wherein the outer coating consists essentially of zirconia stabilized by about 8 to about 30 atomic percent ytterbia and about 4 to about 5 weight percent yttria.
- [c11] A component according to claim 1, wherein the outer coating consists essentially of hafnia stabilized by about 10 to about 50 atomic percent dysprosia.
- [c12] A component according to claim 1, wherein the outer coating consists essentially of hafnia stabilized by about 5 to about 30 atomic percent gadolinium oxide.
- [c13] A component according to claim 1, wherein the outer coating consists essentially of hafnia stabilized by about 5 to about 30 atomic percent samarium oxide.
- [c14] A component according to claim 1, wherein the outer coating consists essentially of hafnia stabilized by about 10 to about 45 atomic percent yttria.
- [c15] A component according to claim 1, wherein the outer coating consists essentially of hafnia stabilized by about 10 to about 50 atomic percent ytterbia.
- [c16] A component according to claim 1, wherein the outer coating further contains about 4 to about 5 weight percent yttria.
- [c17] A component according to claim 1, further comprising a metallic bond coat adhering the outer coating to the component.
- [c18] A component according to claim 1, wherein the component is a superalloy airfoil component of a gas turbine engine.
- [c19] A gas turbine engine component comprising:
a superalloy substrate;
a metallic bond coat on a surface of the substrate; and
a thermal barrier layer as an outermost coating of the component, the thermal barrier layer having columnar grains and a cubic microstructure, the thermal barrier layer consisting essentially of either a stabilized zirconia-based

composition or a stabilized hafnia-based composition;

wherein the stabilized zirconia-based composition is chosen from the group consisting of zirconia stabilized with about 10 to about 45 atomic percent dysprosia, zirconia stabilized with about 10 to about 25 atomic percent erbia, zirconia stabilized with about 10 to about 25 atomic percent gadolinium oxide and up to about 5 weight percent yttria, zirconia stabilized with about 8 to about 22 atomic percent neodymia, zirconia stabilized with about 10 to about 25 atomic percent samarium oxide, zirconia stabilized with about 8 to about 30 atomic percent ytterbia, and zirconia stabilized with about 8 to about 30 atomic percent ytterbia and up to about 5 weight percent yttria; and

wherein the stabilized hafnia-based composition is chosen from the group consisting of hafnia stabilized with about 10 to about 50 atomic percent dysprosia, hafnia stabilized with about 5 to about 30 atomic percent gadolinium oxide, hafnia stabilized with about 5 to about 30 atomic percent samarium oxide, hafnia stabilized with about 10 to about 45 atomic percent yttria, or hafnia stabilized with about 10 to about 50 atomic percent ytterbia.

[c20] A gas turbine engine component according to claim 19, wherein the thermal barrier layer consists of zirconia stabilized by about 10 to about 30 atomic percent dysprosia.

[c21] A gas turbine engine component according to claim 19, wherein the thermal barrier layer consists of zirconia stabilized by about 12 to about 25 atomic percent erbia.

[c22] A gas turbine engine component according to claim 19, wherein the thermal barrier layer consists of zirconia stabilized by about 10 to about 20 atomic percent gadolinium oxide and about 4 to about 5 weight percent yttria.

[c23] A gas turbine engine component according to claim 19, wherein the thermal barrier layer consists of zirconia stabilized by about 8 to about 18 atomic percent neodymia.

[c24] A gas turbine engine component according to claim 19, wherein the thermal barrier layer consists of zirconia stabilized by about 10 to about 20 atomic

percent samarium oxide.

- [c25] A gas turbine engine component according to claim 19, wherein the thermal barrier layer consists of zirconia stabilized by about 15 to about 25 atomic percent ytterbia.
- [c26] A gas turbine engine component according to claim 19, wherein the thermal barrier coating consists of zirconia stabilized by about 15 to about 25 atomic percent ytterbia and about 4 to about 5 weight percent yttria.
- [c27] A gas turbine engine component according to claim 19, wherein the thermal barrier layer consists of hafnia stabilized by about 10 to about 45 atomic percent dysprosia.
- [c28] A gas turbine engine component according to claim 19, wherein the thermal barrier layer consists of hafnia stabilized by about 10 to about 25 atomic percent gadolinium oxide.
- [c29] A gas turbine engine component according to claim 19, wherein the thermal barrier layer consists of hafnia stabilized by about 10 to about 20 atomic percent samarium oxide.
- [c30] A gas turbine engine component according to claim 19, wherein the outer coating consists of hafnia stabilized by about 15 to about 40 atomic percent yttria.
- [c31] A gas turbine engine component according to claim 19, wherein the thermal barrier layer consists of hafnia stabilized by about 15 to about 25 atomic percent ytterbia.